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| SLATER & MATSIL LLP 17950 PRESTON ROAD SUITE 1000 DALLAS, TX 75252 | | | EXAMINER THOMAS, MIA M | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/817,145

Applicant(s)

SCHATZ ET AL.

Examiner

Mia M. Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 August 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is responsive to the applicant's remarks received on 21 August 2007.

Claims 1-13 are pending. Claim 1 is currently amended. Claims 12 and 13 have been added.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-5, 8-10, 12 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Lehman (US 2003/0048939 A1).

Regarding Claim 1, Lehman discloses a method for determining imaging errors of an optical system in the production of a mask for semiconductor component fabrication, the method comprising, ("It is another feature of this invention to provide a method of reticle inspection...so as to be shared by various participants in the process of manufacture of semiconductor devices..." at paragraph [0019]) a) detecting at least one parameter for the characterization of the mask, Figure 1, numeral 1, b) automatically selecting a stored correction data record from a correction database in a manner dependent on said at least one parameter for the characterization of the mask, (Figure 1, numerals 3 and 4, "Indeed, what is involved here is the

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substitution of an image of a fully inspected and error free reticle, referred to herein as the "master" reticle, for the reference die or database information." at paragraph [0024]) c) measuring optical properties of a structure of the mask using a measuring system, ("Figure 1, numeral 6.5 and 7), d) combining measurement results associated with the measured optical properties with the correction data record associated with the mask in a data processing device to produce a corrected measurement result, and e) storing a measurement data record with the corrected measurement result in a database system, (Figure 1, numeral 7, "Each pixel of the inspected image then is compared to corresponding pixels from the stored master image." at paragraph [0037]).

Regarding Claim 2 Lehman discloses wherein the parameter for the characterization of the mask is the wavelength at which the mask is used in a photolithography method, ("Indeed, the inventive method and apparatus are equally applicable to inspection of masks, photo masks, reticles, or any other such product used in similar fashion in the manufacture of semiconductor devices, as for example by a photolithographic process." at paragraph [0076]. " In such an inspection, interferometers could be used, especially where resolution on a wavelength scale is needed." at paragraph [0068]).

Regarding Claim 3 Lehman discloses wherein the parameter for the characterization of the mask is a substance property of the mask ("Referring to Figure 1, the inventive method is implemented as follows. First, a reticle which is know to be good (i.e. is believed to be substantially free of defects, or as free of defects as is reasonably possible) is identified (step 1)." at paragraph [0030]).

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Regarding claim 4 Lehman discloses wherein the correction data record includes information for the correction of inhomogeneities of a radiation source, of the measuring system, in particular of at least one of an associated CCD chip and an optical element, ("Transmission detector 370 and reflection detector 340 may be CCD devices...Light source 310 may be a pulsating laser, as part of the interferometry system, to facilitate inspection of phase shift masks, particularly in conjunction with area CCDs in detectors 370 and 340).

Regarding Claim 5 Lehman discloses wherein the optical element comprises a lens, ("Light passing through the beam splitter 330 then passes through lens 345, and through article (e.g. mask, photomask, or reticle) 350 on an x-y stages 355 which permits transmission of light." at paragraph [0071]).

Regarding Claim 8 Lehman discloses wherein at least one of CD values and positional errors are determined by the measuring system as said measured optical properties of the mask, (Figure 2, numeral 220, "Memory 250 then provides the second binarized stream to compare unit 245." at paragraph [0049]. As scanner technology and associated hardware technology progresses, it is expected that the inventive technique will be applicable for smaller pixel sizes, and hence to smaller geometries in reticles, photomasks, etc." at paragraph [0056]).

Regarding Claim 9 Lehman discloses a device for determining imaging errors of an optical system in the production of a mask for semiconductor component fabrication, the device comprising: ("...and apparatus are provided for inspection of articles through comparison with an image of a master article, which is believed to be substantially free of defects." at paragraph [0023]), a means for detecting at least one parameter for the characterization of a mask, ("In

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step 2, the master reticle (or die) is scanned to obtain a grey level master reticle (or die). The image of that scan is saved to some non-volatile storage device (step 3)." at paragraph [0031]), a correction database with at least one stored correction data record, ("Indeed, what is involved here is the substitution of an image of a fully inspected and error free reticle, referred to herein as the "master" reticle, for the reference die or database information." at paragraph [0024]) a data processing means for automatically selecting a correction data record from the correction database in a manner dependent on said at least one parameter for the characterization of the mask, ("In the course of using the master reticle, the reticle to be inspected is identified (step 5), and the inspection is done relative to the master (step 6), again using unknown image processing, alignment, and correction techniques..." at paragraph [0037]), a measuring system for determining optically measurable properties of the mask, (In Figure 2, a mask is scanned using optical subsystem 220." at paragraph [0046]), means for combining measurement results of the optically measurable properties of the mask with the correction data record associated with the mask to produce a corrected measurement result, ("Each pixel of the inspected image then is compared to corresponding pixels from the stored master image." at paragraph [0037]), and means for generating a measurement data record with the corrected measurement result in a database system, ("...the data can be retained on the DVD (e.g. in a "jukebox"), and directly inspected from there; alternatively, it can be copied to a high performance file system from which the inspection is carried out." at paragraph [0035]).

Regarding Claim 10 Lehman discloses wherein said measuring system includes means for measuring at least one of CD dimensions, and positional errors of one of a CoG mask and a phase shift mask ("The invention is not limited by the particular type of inspection apparatus being used. For example, it is within the contemplation of the invention to use the inventive MRI

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(Master Reticle Inspection) technique in connection with inspection of phase shift masks." at paragraph [0068]).

Regarding Claim 12, (New) Lehman discloses a method for determining imaging errors of an optical system in the production of a mask for semiconductor component fabrication ("It is another feature of this invention to provide a method of reticle inspection...so as to be shared by various participants in the process of manufacture of semiconductor devices..." at paragraph [0019]), the method comprising: detecting at least one parameter for the characterization of the mask (Figure 1, numeral 1,); automatically selecting a stored correction data record from a correction database in a manner dependent on said at least one parameter for the characterization of the mask (Refer to Figure 1, numerals 3 and 4), wherein the correction data record includes information for the correction of inhomogeneities of an illumination system ("In the course of using the master reticle, the reticle to be inspected is identified (step 5), and the inspection is done relative to the master (step 6), again using known image processing, alignment, and correction techniques such as have been adapted in the course of implementing the conventional Die to Die and Die to Database methods." at paragraph [0037]); measuring optical properties of a structure of the mask using a measuring system (Refer to Figure 2, numeral 220); combining measurement results associated with the measured optical properties with the correction data record associated with the mask in a data processing device to produce a corrected measurement result (Refer to Figure 2, numeral 245); and storing a measurement data record with the corrected measurement result in a database system (Refer to Figure 2, numeral 280).

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Regarding Claim 13, (New) Lehman discloses a device for determining imaging errors of an optical system in the production of a mask for semiconductor component fabrication ("...a method and apparatus are provided for inspection of articles through comparison with an image of a master article, which is believed to be substantially free of defects." at paragraph [0023]), the device comprising: a means for detecting at least one parameter for the characterization of the mask (Figure 1, numeral 1,); a correction database with at least one stored correction data record, wherein the correction data record includes information for the correction of inhomogeneities of an illumination system ("Indeed, what is involved here is the substitution of an image of a fully inspected and error free reticle, referred to herein as the "master" reticle, for the reference die or database information" at paragraph [0024]); a data processing means for automatically selecting a correction data record from the correction database in a manner dependent on said at least one parameter for the characterization of the mask (Refer to Figure 1, numerals 3 and 4); a measuring system for determining optically measurable properties of the mask (Refer to Figure 2, numeral 220); means for combining measurement results of the optically measurable properties of the mask with the correction data record associated with the mask to produce a corrected measurement result (Refer to Figure 2, numeral 245); and means for generating a measurement data record with the corrected measurement result in a database system (Refer to Figure 2, numeral 280).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman (US 2003/0048939 A1) in combination with Inoue (US 6,656,648 B2).

Regarding Claim 11:

Lehman discloses the elements of Claims 1-5, and 8-10 as stated in the U.S.C. 102(b) rejection above.

Lehman does not specifically disclose wherein the mask is designed for wavelengths of 365, 248, 193, or 157 nm respectively.

Inoue teaches wherein the mask is designed for wavelengths of 365, 248, 193, or 157 nm respectively ("In the experiment, the imaging is performed by using, for example, a mercury lamp whose wavelength is 365 nm as the light source and using a CCD line sensor imaged by the objective lens of NA 0.75." at column 5, line 29).

At the time the invention was made, it would have been obvious to modify Figure 3, an electronics and computer subsystem 300, as disclosed by Lehman to include the mercury lamp whose wavelength is 365 nm as the light source, as taught by Inoue.

According to Lehman, Figure 3 shows light source 310, which outputs a beam which then enters the optic-scanner. Adding the mercury lamp whose wavelength is 365 nm, as taught by Inoue would provide the subsystem 300 as taught by Lehman with an analysis that may further prevents the errors of the optical correction device. The ability to correct the errors of the subsystem as taught by Lehman while using the domain of wavelengths as taught by Inoue will

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provide the optical system with microscopic details and improvements, and correspondingly will yield improved results in semiconductor manufacture.

6. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman (US 2003/0048939 A1) in combination with Udagawa et al. (US 2004/0126673 A1).

Lehman discloses the elements of Claims 1-5, and 8-10 as stated in the U.S.C. 102(b) rejection above.

Lehman does not specifically disclose wherein the parameter for the characterization of the mask is identified by identification means. Additionally, Lehman also does not specifically disclose **regarding Claim 7**, wherein the identification means comprises a bar code.

Udagawa teaches **regarding claim 6**, ("The reticle 10 also includes a band-shaped identification code 14 as in Figure 6(a). The identification code 14 serves to uniquely identify the reticle..." at paragraph [0025]).

Udagawa also teaches, **regarding claim 7**, "(Typically the identification code 14 is in the form of a bar code, which is the name used generally herein." at paragraph [0025]).

It would have been obvious, at the time that the invention was made, to one of ordinary skill in the art to add the identification means, specifically a barcode, as taught by Udagawa to the device for determining imaging errors of an optical system in the production of a mask for semiconductor component fabrication as disclosed by Lehman. "The identification code serves to uniquely identify the reticle, thereby facilitating control of the automated traffic of multiple reticles 10 into and out of the microlithography system." at paragraph [0025].

Response to Arguments

7. Applicant's arguments filed 21 August 2007 have been fully considered but they are not persuasive.

8. Applicant's arguments see page 12 of 13, filed 21 August 2007, with respect to Specification and Drawing "Figure 2", have been fully considered and are persuasive. The of objection to the drawings and the specification have been withdrawn.

Claim Rejections

- Applicant's Argument: "The disclosure by Lehman does not suggest or teach combining the measurement result to produce a corrected measurement result. Rather...Lehman teaches an inspection process...

1. Examiner's Response: Examiner disagrees with the applicant's argument. Therefore, the rejection of Claim 1 stands and is repeated above. In response to applicant's argument that Lehman does not suggest or teach combining the measurement result to produce the corrected measurement result, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Examiner agrees that Lehman teaches an inspection process. As quoted from the remarks on page 12, with reference to Figure 1, numeral 7, "this technique performs reticle inspection and identifies, defects and outputs appropriate file (data)". Accordingly with the definition of inspection and produce (production-action taken), Examiner argues that the act of inspecting is

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the recognition of a pattern leading to an immediate solution of a problem. Examiner also argues that the act of producing or production is the ability to oversee the making of. Further, by clarifying the definition of "produce" with reference to "produc[ing] a corrected measurement, there has to be an overall inspection and/or solution to the problem of the measurement result and therefore, it will produce the appropriate correction measurement which is disclosed at Figure 1, numeral 7. Additionally, it is further shown that at Figure 2, numeral 290, there is an output of data. The action taken is to produce a corrected measurement at Figure 2, numeral 220-Optical Subsystem Scanning, specifically disclosed at Figure 1, steps 1-7, the output or further production of the analyzed and corrected measurement data is present, therefore the rejection of Claim 1 stands.

- Applicant's Argument: "Claims 2-8 depend from Claim 1 and add further limitations."

Examiner's Response: Examiner disagrees with applicant's argument. Since the rejection of Claim 1 stands, the rejections of Claims 2-8 also stand and are repeated above.

- Applicant's Argument: "Claim 9... Lehman does not suggest or teach a means for combining the measurement result to produce a corrected measurement result."

Examiner's Response: Examiner does not agree with the argument as stated above. Examiner explained the position regarding inspection vs. production as stated above at the Examiner's Response to Claim 1. It is further described at Figure 1, numerals 6 and 6.5 that these elements can be combined together to explain the corrected measurement result, thus the rejection of claim 9 also stands.

- Applicant's Argument: "Claim 10 and 11 depend from claim 9 and add further limitations."

Examiner's Response: Examiner has maintained the rejection of claim 9 as stated above and therefore the rejection of Claims 10 and 11 also stand and are repeated above.

- Applicant's Argument: "Claims 12 and 13 are newly added and specifically recites "the correction data record includes information for the correction of inhomogeneities of an illumination system."

Examiner's Response: Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Applicant argues that Lehman does not teach or suggest correction data information however Examiner states that at paragraph [0024], Lehman discloses that "Other aspects of image processing, or accounting for misalignments as a reticle is scanned, are common to the invention and to the conventional techniques. Thus, details of such image processing and alignment may be found in the above-referenced patents, which have been incorporated by reference. Indeed, what is involved here is the substitution of an image of a fully inspected and error free reticle, referred to herein as the "master" reticle, for the reference die or database information." It is understood that a "misalignment" can be treated as an inhomogeneity, therefore, the rejection of claims 12 and 13 are appropriate and correct. Additionally, a reference die or database information would reasonably be considered correction data to one of ordinary skill in the art.

Conclusion

9. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mia M. Thomas whose telephone number is 571-270-1583. The examiner can normally be reached on Monday-Friday 8:30am-5pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Mia M Thomas
Examiner
Art Unit 2624

Mia M. Thomas



VIKKRAM BALI
PRIMARY EXAMINER